

Conclusion

About the Ecological Footprint of the United States and of Sustainable Development in General

The language of science tends to separate humanity from its context. At the beginning of the third millennium, the seriousness of threats to our environment precludes the continued use of dualistic modes of thought to confront the challenges of sustainable development as an extension of group identity. We must also understand where we are, and employ the tools of geography to chart a responsible course.

Since publication of work by Wackernagel and Rees [WAC 95], the notion of “ecological footprint” has become key, even if a fashionable “indicator” of sustainable development, particularly in the United States of America. The concept is interesting within the context of geography. Unlike economic indicators, an ecological footprint is not expressed in monetary units, but in “global hectares” (1 hectare = 2.47 acres). The idea is attractive, but we must first accept that the regenerative capacity of the biosphere is the limiting factor for human development over the long term. This implies that the transformation of non-renewable resources such as fossil fuels is factored into accounting only to the extent that it affects the integrity of nature and its capacity for self-renewal. The calculation of an ecological footprint is a form of accounting in which the “supply-side” consists of the sea and land’s biological productivity while human consumption and waste constitute the “demand-side”. An environment’s “biological capacity” includes the reproduction of renewable resources such as timber, fish and livestock, and the biosphere’s capacity

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for sequestering CO₂ in ocean and land biomass. On the demand side, we evaluate the record of harvests for human consumption (fishing, forestry, crops, grazing lands, etc.), the removal of land from productive inventory for construction, environmental degradation through production of waste, and in particular, the production of CO₂ emissions through the combustion of fossil fuels. The results are expressed in units of surface area using formulas built on equivalencies. The calculations supposedly conform to the laws of thermodynamics and are consistent with the principles of ecology. Unfortunately, the indicator is imperfect since calculations are complex and equivalencies controversial, such that the scientific controversy relating to the various environmental parameters has produced a proliferation of accounting methods which not only do not agree but frequently obscure the debate.

Whatever the relevance of figures advanced here and there, one cannot deny that the ecological footprint of the United States far exceeds their national resources. The excess of consumption over the natural capacity for regeneration is not sustainable over the long term (overshooting), as it entails drawing on the natural wealth of the land, thus reducing its ability to support the development of future generations. Such overshooting contributes heavily to the production of greenhouse gases. The arguments are quite convincing and many environmental NGOs have adopted this accounting.

According to the Global Footprint Network created by Wackernagel [EWI 08], in 2005, biologically productive surfaces available per inhabitant amounted to less than 1.6 hectare-equivalents of dry land and 0.5 hectare-equivalents of ocean surfaces, mainly located on continental shelves. To ensure sustainable development and the preservation of biodiversity, humanity should reserve at least 12% of available surface areas for other species. These lands should be classified as protected areas and set aside as nature reserves, out of reach of human activity. At least, this is the recommendation of the Brundtland Report [BRU 87]. Biologists however, go further and suggest that fully a third of biologically productive areas should be protected. With acceptance in principle and agreement on accounting methodologies, a general scheme may be broken down by country, region, city and even household.

The largest countries by surface area naturally have the greatest advantage, provided that the surface area is not desert land (see Table 10.1). Biological productivity is also higher in hotter regions than in colder regions. Thus, by Wackernagel's accounting, the United States are the most productive biotope before Brazil.

Country	2005 Population (millions)	2005 GNP (billions \$)	Estimated biological capacity (millions km ²)	Ecological footprint (millions km ²)	Eco-deficit (100 = equilibrium)
<i>The World</i>	6,475.23		13,340.521	17,420.115	131
United States	298.21	12,270.000	1,497.014	2,809.138	188
Brazil	186.41	644.000	1,353.337	439.928	32
Russian Federation	143.2	639.000	1,161.352	537.000	46
People's Republic of China	1,323.35	2,264.000	1,138.081	2,792.268	245
Canada	32.27	1,052.000	647.013	228.149	35
India	1,103.37	793.000	452.382	981.999	217
Indonesia	222.78	282.000	309.684	211.641	68

Table 10.1. *The seven largest countries in the world
in terms of biological capacity [EWI 08]*

In the latest version of Wackernagel's database [EWI 08], in 2005 the United States, with 6% of global landmass and only 4.6% of global population, produced a quarter of global wealth and controlled 11.2% of the planet's total biological capacity. Compared to China, the United States emerges as a land of plenty. But, according to Wackernagel, longstanding American consumption and waste production exceed national biological capacity. If we give credit to this accounting, the United States contributed 16% of humanity's global ecological footprint and would need an area 1.9 times the actual surface area of the United States. China is just behind the U.S. in exceeding its biological capacity in 2005. It would be interesting to update this ecological accounting to see how China's economic development has pushed China to exceed the United States' overall footprint around 2008, although it should be noted the United States has made no serious effort to reduce its own footprint. In practice, the United States imports a growing share of their necessities since the Second World War, while their natural resources continue to be depleted (see Chapter 2). This has not hindered American growth; quite the contrary, since wealth is measured not by production but by the full consumption of goods available throughout the world at prices set in terms of what the market will bear, which is roughly the description of international trade since 1945 (see Chapter 6).

Relative to its population, the ecological footprint of the United States is considerable. If other, more populous countries of the world, particularly China and India, were ever to attain the same level of environmental impact as recorded in the US today, humanity would require 4.6 Planet Earths to sustain consumption and sequester or otherwise recycle pollution. It is possible to discuss these orders of magnitude, while some even try to discredit the concept. However, the intensity of global warming in the late 20th century is proof that, overall, the production of greenhouse gases caused by fossil fuel consumption by far exceeds the world's natural carrying capacity.

In general, it is the richer countries who have the largest per capita ecological footprint defined in global hectares (gha) per capita, meaning that development and population growth in emerging countries pose a serious challenge to sustainable development (see Table 10.2). The US has the worst position among developed countries, except for two small and heavily urbanized countries (Singapore and the United Arab Emirates).

Country	GDP per capita (\$ 2005)	Ecological footprint (gha/inh.)	Biological carrying capacity (gha/inh.)	Overshooting index (100 = equilibrium)
Singapore	27,842.	11.23	0.03	37,400.
United Arab Emirates	24,213.	9.46	1.08	876.
United States	43,743.	9.42	5.02	188.
Kuwait	23,423.	8.89	0.53	1,677.
Denmark	47,363.	8.04	5.70	141.
Australia	32,170.	7.81	15.42	50.
New Zealand	25,942.	7.70	14.06	55.
Canada	32,546.	7.07	20.05	35.

Table 10.2. *The first eight countries in the world ranked according to their per capita ecological footprint [EWI 08]*

Ecological footprint	Total consumption (gha/inh. equivalent) DEMAND	Biological carrying capacity	Adjusted production (gha/inh. equivalent) SUPPLY
CO ₂ emission	6.51		
Built-up land	0.10	Built-up land	0.10
Cropland	1.38	Cropland	2.30
Grazing land	0.30	Grazing land	0.29
Forest land	1.02	Forest land	1.78
Fishing grounds	0.10	Fishing grounds	0.55
Global footprint	9.42	Total carrying capacity	5.02

Table 10.3. *Simplified accounting for the ecological footprint of the United States in 2005 [EWI 08]*

American overconsumption of environmental resources is not simply a result of wealth (see Table 10.3), but more significantly, a product of the United States' specific geography. Approximately 69% of the environmental footprint of the United States is attributable to the consumption of fossil fuels, compared to an average of 52% worldwide. America is a high consumer of energy: for an equivalent level of development, Americans consumed 358,400 Kilo-Joules per capita in 2005 against an average of 152,700 Kilo-Joules per capita for the 27 member countries of the European Union. However, to this over-consumption of energy, one must add an additional amount arising from urban sprawl and oversized infrastructures [MLE 08].

We have already discussed these issues in our book. Part of the American overconsumption of energy is due no doubt to geographic factors including the harsh climate (see Chapter 1), the need to harness the productive capacity of the geographical spaces (see Chapter 2) and the necessity of integrating an immense physical space (see Chapters 5 and 6). The dependence of the United States on fossil fuels, particularly oil, is mainly due to insatiable demand in the transportation sector. The extent of the transportation infrastructure is in turn related to traffic intensity (see Chapter 7). This dependency is a source of geopolitical, economic and environmental vulnerability. Its geography alone leads us to conclude that American consumption will prove extremely difficult to reduce. Fossil fuel reliance for up to 86% of total energy needs puts the United States behind Europe in the development of renewable energies and the diversification of energy resources. In view of the impending exhaustion of domestic oil reserves and a geopolitical context which appears increasingly negative, the United States now have their back against a

wall in terms of finding alternative fuels to power their automobiles and airplanes. The United States must also diversify their energy sources for production of electric power, another area that has recently shown its vulnerability and decay of its infrastructure (i.e. Northeast Blackout on August 15, 2003).

Overuse of natural resources by US cities is also related to urban sprawl (see Chapters 7 and 8) which increases energy consumption (lighting, heating and air conditioning), boosts infrastructure and transportation requirements and reduces environmentally productive lands. Urbanization has often overwhelmed fragile ecosystems, especially in coastal areas (see Chapter 9). Experts have warned the authorities of the risks incurred by rampant urbanization. Generally, these warnings have been ignored, officially to protect individual rights and freedoms, and in practice, for the mutual enrichment of developers and landowners. Public awareness has not been raised regarding environmental problems except when the relationship between the city and the city's natural habitat reached crisis proportions, either through worsening floods, depletion of water resources and aggravated air, water and soil pollution. Environmental issues first entered the public consciousness as local issues, but it was only in the 1970s that the environmental debate became a national concern. Natural resource conservation and planning have been undertaken haphazardly and were very quickly opposed by industrial and real-estate lobbyists, and by voters more concerned with low taxes and access to affordable housing than the protection of biodiversity and fragile ecosystems. For now, it is clear that progress in preserving the environment has been limited and all too frequently swept away for the sake of economic growth, not out of necessity, but out of a long entrenched habit of picking free meals from the environment, and the culturally inherited preference for regulating social relations by distancing oneself from unwanted neighbors.

Environmental concern in the American public opinion is now evident. It is fuelled in particular by road congestion and air pollution in the nation's cities, to the point where urban and environmental issues have become issues in the presidential campaign. The Democratic candidate elected in November 2008, Barack Obama has committed his administration to the environment more clearly than all other candidates in both major parties. We are undoubtedly on the edge of a major shift in United States environmental policy, a change which may yet see an end to the neo-liberal environmental policies of Ronald Reagan and his successors (1980-2008) and the Federal Government's refusal to intervene in local environmental issues.

The transition to policy framework conducive to building more compact cities and promoting public transportation networks will nonetheless be very difficult despite the wide publicity and critical acclaim for the recommendations of New

Urbanism. City production systems are closely related to the historical paths followed in their development and the very low density of American cities will probably be the first obstacle to reducing dependency on automobiles. Even with the imposition of limits on urban sprawl (i.e., the adoption of urban growth boundaries), the public transportation profitability threshold of 30 inhabitants per hectare will be very long in coming for most metropolitan areas (see Chapters 7 and 8). But beyond this technical obstacle, planners also face attitudes unprepared for intensified urban land use (“Nimby attitudes”).

Americans are fiercely individualistic and generally opposed to the densification of their neighborhoods, especially in the newer suburbs. The garden city ideal is not supportive of nature not only because it is energy-intensive, but because it consumes a significant amount of expensive natural resources such as water. It is easy to illustrate this with an example. The prodigious amounts of water used to maintain the fountains and golfing greens of Las Vegas in the middle of the desert is seen by some as an intolerable waste of a scarce resource, and they have been nicknamed the “green carpet”¹ of Las Vegas in the United Nations Environment Program: 2006-2007.² In this desert region, the catchment basin of the Colorado River no longer suffices to supply Las Vegas’ sprawling urban footprint and depleting groundwater, so that the regional regulatory agency, the Southern Nevada Water Authority, has been working on projects of Pharaonic proportions to bring fresh water from the north of the state.

In contrast, we saw in Chapter 9 how New Orleanians rejected out of hand proposals to increase urban density recommended by the Bring New Orleans Back Commission in 2006 so as to reduce the city’s vulnerability to flooding hazards. Residents prefer to rely, as before, on structural protections, the levees, which require maintenance and regular technical improvements. Even in cases of demonstrated need such as this, the urgency of reducing vulnerability to natural disasters is not perceived as sufficient to justify the intensification of urban land use. It is only since the deteriorating economic conditions with the subprime crisis and the growing number of expropriations since the summer of 2006 that we have observed a willingness to reverse attitudes and preferences. The question remains whether such new attitudes favourable to denser land use will resist the return to prosperity, and whether the ideas advocated by proponents of *New Urbanism* and environmentalists will have sufficient time to spread widely throughout society and end the cycle of limitless sprawl which characterized United States urbanization from 1945 to 2005.

1. An allusion to Las Vegas’ economic specialization and the colour of game furniture’s carpet.

2. A few remarkable images may be examined on the UNEP program website [UNEP].

Sustainable development cannot be decreed and depends on society's dominant values. The emergence of debate on community ecological footprints shows that the United States is changing its outlook on the world, progressively taking into account the perils of a form of development which is based on extensive use of land, dependence on fossil fuels and wasted natural resources. However, it is only when it comes to implementation of Agenda 21 and the critical evaluation of urbanization and mobility patterns that we can measure how the force of habit, cultural preconceptions and social divisions push American society further away from the objectives of sustainable development. Let us hope that the Obama presidency beginning on January 20, 2009 will mark a new beginning and that America will once again innovate and surprise us by its power of resilience.